MECHANISM OF THE THERMAL DECOMPOSITION OF ETHANETHIOL AND DIMETHYLSULFIDE

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Combustion of organosulfur contaminants in petroleum-based fuels and biofuels produces sulfur oxides (SO_x). These pollutants are highly regulated by the EPA because they have been linked to poor respiratory health and negative environmental impacts. Therefore much effort has been made to remove sulfur compounds in petroleum-based fuels and biofuels. Currently desulfurization methods used in the fuel industry are costly and inefficient. Research of the thermal decomposition mechanisms of organosulfur species can be implemented via engineering simulations to modify existing refining technologies to design more efficient sulfur removal processes. We have used a resistively-heated SiC tubular reactor to study the thermal decomposition of ethanethiol (CH_3CH_2SH) and dimethylsulfide (CH_3SCH_3). The decomposition products are identified by two independent techniques: 118.2 nm VUV photoionization mass spectroscopy and infrared spectroscopy. The thermal cracking products for CH_3CH_2SH are CH_2CH_2, SH, and H_2S and the thermal cracking products from CH_3SCH_3 are CH_3S, CH_2S, and CH_3.